

## WORKSHEET 7.3

# Why Are Plants Not Always Green?

### Introduction

Suppose a researcher tested the effect of light wavelength on photosynthetic activity. In the experiment photosynthesis rate was measured by  $O_2$  production. A graph of the results, called an action spectrum, would look something like Figure 7.1.

The graph resembles the absorption spectra for chlorophyll a and chlorophyll b, but there are some subtle but important differences. Compare the graph to the absorption spectra for the chlorophylls.

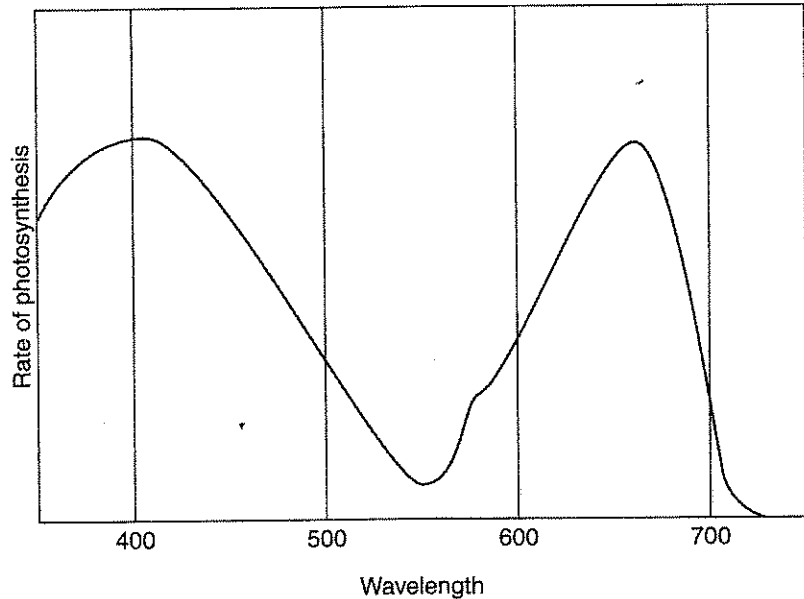


Figure 7.1. Action Spectrum

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### Discussion Questions

1. What observations can you make about similarities and differences?

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2. Now focus on the left half of the graphs. Notice that the photosynthesis graph has a wider left peak than the chlorophyll absorption graphs. It doesn't bottom out until 550 to 600 nm. What does this mean?

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## Why Are Plants Not Always Green?, *Cont'd.*

3. The action spectrum shows that photosynthesis occurs even in light that is not absorbed by chlorophyll a or b. Propose an explanation for this.

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4. How could you collect evidence to support your hypothesis?

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### Graphing

Use the data from Table 7.2 to make an absorption spectrum graph for carotenoids, as you have done previously for chlorophyll a and b. Your teacher might have you put it on the same graphs as those.

**Table 7.2. Data**

Wavelength	Carotenoids % Absorption
400 nanometers	22
425 nanometers	23
450 nanometers	49
475 nanometers	43
500 nanometers	55
525 nanometers	34
550 nanometers	0
575 nanometers	0
600 nanometers	0
625 nanometers	0
650 nanometers	0
675 nanometers	0
700 nanometers	0

## Why Are Plants Not Always Green?, *Cont'd.*

### Analysis

1. By looking at your graph, explain why the action spectrum for photosynthesis shows wider activity than the absorption spectra for the chlorophylls.

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2. What color are carotenoids? Explain.

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3. What is the adaptive value of accessory pigments like carotenoids? That is, what advantage do they provide plants?

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### Web/Library Research

Find information to explain the following:

1. Leaves of trees in many parts of North America change color in the fall or before a dry season. Explain why and relate your explanation to carotenoids.

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2. What is beta carotene? Where is it found? What does it do for plants? Why is it beneficial in a human diet?

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